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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,232	10/16/2003	Shung-Huei Chang	890-007.003	8049

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EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/687,232

Applicant(s)

CHANG ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 22, 2007 has been entered.

Response to Amendment

1. In response to the amendment received January 22, 2007:
 - a. Claims 1-21 are pending;
 - b. The claim objection is withdrawn in light of the amendment
 - c. The 112 rejection is withdrawn in light of the amendment;
 - d. The prior art rejections of record stand.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 5-10, 12 and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of Koripella.

Jankowski discloses of an apparatus and method of fabricating a fuel activation assembly for use in a fuel cell, the fuel cell comprising a first cell compartment for containing a first fuel component and a second cell compartment for containing a second fuel component, wherein the fuel activation assembly is disposed between the first cell compartment and the second cell compartment so as to activate the first fuel component for producing protons in the first cell compartment and for channeling the protons to the second cell compartment, said method comprising the steps of: providing a substantially planar substrate 44 in the fuel cell, the substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell

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compartment, the substrate having a plurality of apertures 43 made through the first surface and the second surface; and securely attaching a plurality of membrane electrode assembly segments 41 to the substrate over the apertures 43, each membrane electrode assembly segment 41 comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment 41 has a first side and an opposing second side, the second side adjacent to the second cell compartment, the first side adjacent to the first cell compartment for activating the first fuel component in order to produce the protons and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments (Figs. 2 and 3 as applied to claims 1, 5 and 12).

The fuel cell further comprising a first electrically conducting terminal operatively connected to the first cell compartment; and a second electrically conducting terminal operatively connected to the second cell compartment, so as to allow a current load to connect to the first and second electrically conducting terminals to use the electrical current (as applied to claim 6).

The substrate is composed of a material selected from the group consisting of silicon, glass, ceramic, and plastic which is inherently resistant to diluted methanol mixtures (prior art claim 5 as applied to instant claim 7).

The oxygen source was simply air on the top side of the structure (Jankowski, paragraph bridging columns 6 and 7 as applied to claim 9).

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Each MEA includes a proton exchange membrane sandwiched between two electrode layers (Fig. 3 as applied to claims 10 and 13).

Jankowski does not teach of providing a plurality of membrane electrode assembly (MEA) segments (claims 1 and 5) or of the fuel being a mixture of methanol and water (claims 7-9).

As to claims 1 and 5:

Upon further consideration it would appear that the MEA 41 of Jankowski is a continuous film, as argued by Applicant.

However it is the Examiner's position that providing a plurality of membrane electrode assembly (MEA) segments would have been obvious to one of ordinary skill in the art given the teachings of Koripella.

Koripella discloses providing a plurality of discrete MEAs on a substrate surface wherein each MEA covers an individual orifice in the substrate surface (see Figs. 1 and 2).

While Jankowski teaches of a single continuous film, it is apparent that the film portions which are not provided over the openings in the substrate are not readily exposed to the reactants and thus would appear to be wasteful use of the MEA components and catalytic materials.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing a plurality of membrane electrode assembly (MEA) segments wherein each segment is provided over a corresponding opening, as taught by Koripella since it would have

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improved the utilization of MEA materials in the fuel cell structure by only providing the MEAs over the openings wherein reactants are provided.

As to claims 7-9:

The difference not yet discussed is of the fuel being a mixture of methanol and water.

The fuel mixture of Jankowski can include methanol (col. 3, ll. 5-10).

Koripella teaches of using a diluted methanol fuel (col. 1, ll. 28-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing a dilute methanol fuel since and further since the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view Koripella, as applied to claim 1 above, in further view of JP 11-045729 (JP '729).

The teachings of Jankowski and Koripella have been discussed above with respect to the fuel cell arrangement.

Jankowski does not teach of the fuel cells having a heat bonding process for sealing the fuel cell.

JP '792 discloses using hot-melt seals in PEM fuel cells to seal the reactants from one another and from external contaminants.

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The motivation for using sealing the fuel cell substrate is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

4. Claim 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowski in view of Koripella, as applied to claim 1 above, in further view of either U.S. Patent No. 6,960,403 (Morse) or U.S. Patent Application Publication No. 2005/0019635 (Arroyo).

The teachings of Jankowski and Koripella have been discussed above with respect to the fuel cell arrangement.

The differences between claims 3 and 4 and Jankowski are that Jankowski does not teach of using an adhesive to create a barrier (claim 3) or of the fuel being a mixture of methanol and water (claim 4).

As to claim 3:

Morse discloses sealing a microscale planar fuel cell between adjacent substrates (Fig. 2) wherein the sealing is provided to prevent reactant crossover between the anode and cathode. The bonding material is provided with an adhesive (col. 3, ll. 30-32). Arroyo discloses using an adhesive bonding to seal opposing base

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plates in a direct methanol fuel cell (para. [0068], [0097], [0100] and [0101]). The motivation for using an adhesive is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

As to claim 4:

The fuel mixture of Jankowksi can include methanol (col. 3, ll. 5-10).

Koripella teaches of using a diluted methanol fuel (col. 1, ll. 28-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by providing a dilute methanol fuel since and further since the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowksi in view Koripella as applied to claims 5 and 10 above and in further view of U.S. Patent No. 6,127,058 (Pratt) .

The teachings of Jankowksi and Koripella have been discussed above with respect to the fuel cell arrangement.

The difference between claim 11 and Jankowksi is that Jankowksi does not teach of using diffusion layers over the electrodes.

According to Pratt: Electrodes of the MEA have several functions. They must: 1) diffuse oxygen and hydrogen evenly across the surface, 2) allow water molecules to escape (principally a cathode-side issue), 3) hold back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyze the reactions, 5) conduct electrons so they can be collected and routed through an electrical circuit, and 6) conduct protons a very short distance to the proton exchange membrane. To accomplish these disparate needs, MEAs typically consist of several layers of various forms of carbon and polymers in addition to the catalyst. Both the water management and the electron conduction functions are satisfied with dual role diffusion layers which are sandwiched over the catalyst layers. These diffusion layers are usually comprised of woven carbon fiber cloth or porous carbon paper. In practice, the diffusion layer can be integral to the electrodes, integral to the current collectors, or a separate piece sandwiched between the current collector and the electrode. In our preferred embodiment, the diffusion layer is incorporated in the electrodes, but it can also be part of the current collector or a separate piece. For simplicity, we assume that the diffusion layer does not restrict the relative proximity of the current collector and the electrode.

The motivation for using diffusion layers in the electrodes or adjacent to the electrodes in an MEA is that it diffuses oxygen and hydrogen evenly across the surface,

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2) allows water molecules to escape (principally a cathode-side issue), 3) holds back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzes the reactions, 5) conducts electrons so they can be collected and routed through an electrical circuit, and 6) conducts protons a very short distance to the proton exchange membrane.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by employing diffusion layers in the electrodes or adjacent to the electrodes in an MEA since it would have diffused oxygen and hydrogen evenly across the surface, 2) allowed water molecules to escape (principally a cathode-side issue), 3) held back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzed the reactions, 5) conducted electrons so they can be collected and routed through an electrical circuit, and 6) conducted protons a very short distance to the proton exchange membrane.

6. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowksi in view of Koripella, as applied to claims 12-13 above, and further in view of either DE 19624887 (DE '887) or U.S. Patent No. 6,127,058 (Pratt).

The teachings of Jankowksi and Koripella have been discussed above with respect to the fuel cell arrangement.

Jankowksi does not teach of the fuel cells being connect in parallel (claim 14), series (claim 15) or in parallel and in series (claim 16).

DE '887 discloses that connecting plural fuel cells both in parallel and in series permits the fuel cells to more readily match required load demands. Referring now to FIG. 3, when the fuel cell 20 is laminated together, the interconnect means 26 in each of the current collector assemblies 21, 22 are connected to each other outside the periphery of the MEA to provide a path for electron transfer between anodes and cathodes. These connections 32, while shown as a series circuit, can also be arranged in parallel, or in a combination of series/parallel, depending on the output desired from the fuel cell (Pratt, col. 4, ll. 40-55)

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowksi by providing a series circuit, parallel circuit, or a combination of series/parallel circuitry, depending on the output desired from the fuel cell.

7. Claims 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jankowksi in view of Koripella and U.S. Patent No. 7,033,691 (Mardilovich).

Jankowksi discloses of an apparatus and method of fabricating a fuel activation assembly for use in a fuel cell, the fuel cell comprising a first cell compartment for containing a first fuel component and a second cell compartment for containing a second fuel component, wherein the fuel activation assembly is disposed between the first cell compartment and the second cell compartment so as to activate the first fuel component for producing protons in the first cell compartment and for channeling the protons to the second cell compartment, said method comprising the steps of: providing a substantially planar substrate 44 in the fuel cell, the substrate having a first surface

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facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures 43 made through the first surface and the second surface; and securely attaching a plurality of membrane electrode assembly segments 41 to the substrate over the apertures 43, each membrane electrode assembly segment 41 comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment 41 has a first side and an opposing second side, the second side adjacent to the second cell compartment, the first side adjacent to the first cell compartment for activating the first fuel component in order to produce the protons and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments (Figs. 2 and 3 as applied to claim 17).

Jankowski further teaches that the fuel cell design therein is provided as "battery replacements" and therefore obviously used in portable electronic devices.

Jankowski does not teach of providing a plurality of membrane electrode assembly (MEA) segments (claim 17) or of the particular load (claim 17).

Regarding the MEA segments:

Upon further consideration it would appear that the MEA 41 of Jankowski is a continuous film, as argued by Applicant.

However it is the Examiner's position that providing a plurality of membrane electrode assembly (MEA) segments would have been obvious to one of ordinary skill in the art given the teachings of Koripella.

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Koripella discloses providing a plurality of discrete MEAs on a substrate surface wherein each MEA covers an individual orifice in the substrate surface (see Figs. 1 and 2).

While Jankowski teaches of a single continuous film, it is apparent that the film portions which are not provided over the openings in the substrate are not readily exposed to the reactants and thus would appear to be wasteful use of the MEA components and catalytic materials.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by providing a plurality of membrane electrode assembly (MEA) segments wherein each segment is provided over a corresponding opening, as taught by Koripella since it would have improved the utilization of MEA materials in the fuel cell structure by only providing the MEAs over the openings wherein reactants are provided.

Regarding the claimed load:

The use of direct methanol fuel cells in various portable electronic devices, including portable computers and PDAs is a well known power source for such devices as shown by Mardilovich (col. 1, ll. 20-40). The motivation for using fuel cells in portable computers or PDAs is that it provides the portable electronic device with a light-weight, reusable, efficient, and reliable power sources.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Jankowski by selecting the load to be a portable electronic device since it would have provides a portable electronic

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device having an alternative power source which is light-weight, reusable and more efficient than conventional batteries.'

Response to Arguments

8. Applicant's arguments filed January 22, 2007 have been fully considered but they are not persuasive in light of the new grounds of rejection.

While Jankowski may not explicitly teach of MEA segments, this arrangement is obviated by the additional teachings of Koripella for the reasons set forth above. Thus the claimed invention is held to be obvious over the teachings of the prior art references relied upon in the rejections stated herein.

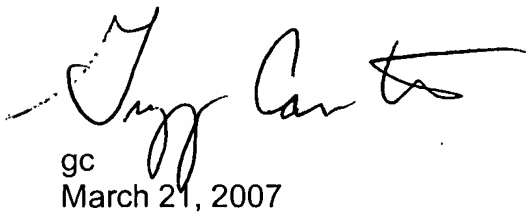
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



gc
March 21, 2007

Gregg Cantelmo
Primary Examiner
Art Unit 1745